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Foreign Animal Disease Report

United States Department of Agriculture
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Emergency Programs

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In This Issue

Current Events

Emergency Field Operations

Avian Influenza Survey. Since the outbreak of avian influenza (AI) in the spring of 1986, type H5N2 virus continues to be isolated from a few live bird markets of the New York-New Jersey area. (See 14-1.) These recurring isolations are a concern to the poultry industry and regulatory officials. There is a need to collect and test specimens from botanicas (specialty poultry retailers) in Miami, Florida, and other locations across the country to determine if the infection has spread to other markets.

To fulfill this need, a national survey will be completed by April 15. Approximately $740,000 of the contingency funds appropriated by Congress for avian influenza outbreaks this year will be used. Further action beyond the survey will be determined by the extent of the problem and the industry's need for further action. Live birds at markets, dealer establishments, wholesale facilities, and other enterprises that market live birds will be sampled. The history of the sampled poultry will be obtained from the sellers. If the results of laboratory tests of specimens are positive, additional tracing and sampling will be done.

Hog Cholera Investigation. A yearly blood sampling of certain swine herds of the New England area is routinely done to determine the possible presence of antibodies for hog cholera (HC) and African swine fever (ASF). The blood is also tested for evidence of brucellosis and pseudorabies. This supplements the yearly testing of approximately 20,000 blood samples from slaughter plants in Texas, Puerto Rico, New Jersey, and New England for HC and ASF. Any positive test results are immediately reported by National Veterinary Services Laboratories (NVSL) to Emergency Field Operations (EFO) and Veterinary Services (VS) regional offices for followup investigation.

On January 30, 1987, NVSL reported that serums from a New Hampshire garbage-fed swine herd had titers suggestive of HC. Bovine virus diarrhea (BVD) titers were also present in most samples. An extensive investigation was initiated, and the northern Regional Emergency Animal Disease Eradication Organization (READEO) team was activated at Waltham, MA. Additional specimens from swine on the affected farm were submitted to NVSL and the Foreign Animal Disease Diagnostic Laboratory (FADDL), and many other farms were inspected. By February 9, results of all tests and inspections confirmed the absence of a disease emergency and the READEO team was deactivated. The swine in question were held under quarantine for an additional period because of multiple disease problems including pseudorabies and pneumonia. (Dr. A. E. Hall, 301-436-8073)

Far East Animal Health Notes

South East Asia and adjoining areas in the South Pacific represent a rather diversified picture in terms of animal diseases of concern to the United States. On the one hand there are countries like Australia and New Zealand, which have a very favorable disease situation, comparable to the one in the United States. The other end of the scale presents a number of countries less fortunate, some with rather unique situations. Most, however, have what must be considered active and relatively well-functioning Veterinary Services, working hard to hold or advance the line against disastrous animal diseases.

The Office International des Epizooties (OIE) list naming diseases of major international importance (List A) starts with **foot-and-mouth** disease (FMD). The disease is not at all evenly distributed in the region. New Zealand and Australia are FMD free, but the incidence appears to increase toward the Asian continent. While Indonesia also claims to be FMD free, Malaysia and Thailand still have problems with Type Asia 1. No reports of any kind come out of Vietnam, Laos, or Cambodia, but unofficial information indicates problems with FMD. The People's Republic of China (PRC) does not report outbreaks, but it is known that at least two swine operations in the South have been depopulated to eradicate outbreaks. Hong Kong, a most important hub for commercial activities in and out of PRC and the rest of the world, reflects this postion in its disease situation. Along with FMD, swine vesicular disease, hog cholera, and Newcastle disease are periodically diagnosed there. Since most of the animal products consumed in Hong Kong are procured as livestock from PRC, the Hong Kong animal disease situation is often assumed to mirror the one in PRC. Not surprisingly, however, discussions with PRC veterinarians often reflect their opinion that many of their problems originate from Hong Kong. FMD has not been seen in Singapore for some time. Taiwan, Korea, and Japan remain FMD free. In the Philippines, FMD occurs sporadically in some areas, but the island of Palawan was recently considered to be free by an Associated South East Asian Nations (ASEAN) commission looking into such matters. No reports of FMD come from the numerous islands and territories in the South Pacific. On the other end of the region, India, Sri Lanka, Bangladesh, Nepal, and Burma still have the disease.

Rinderpest (RP) is reported from India, but has not made a reported appearance in other countries of the Far East since the 1950's, with the exception of an introduction in Nepal. South Korea still vaccinates for RP in northern border areas. **Contagious bovine pleuropneumonia** still occurs in India and Bangladesh. **Hog cholera** is held in check by vaccination in all swine-producing countries in the region. One must wonder why more efforts at eradication are not undertaken instead of control measures only, especially since some countries now have tremendously large commercial swine operations. Should African swine fever ever appear in this region, it would most likely be confused with HC, with potentially disastrous consequences.

Newcastle disease is reported from all poultry-raising countries in the region, Australia and New Zealand being the exceptions. Attempts at control, especially in rural backyard flocks, have included a new method of vaccination with feed pellets containing a nonpathogenic, heat-resistant virus strain. The method, now in field trials, appears promising.

Some diseases, while not on the OIE List A, are unique to the region and of more than local importance. The worst one appears to be **hemorrhagic septicemia**, caused by highly pathogenic pasteurella species. (See review, 13-2.) Much research has been done and a number of vaccines are in use, but a really satisfactory solution for this problem remains to be found. The government veterinary diagnostic laboratory in Peradeniya, Sri Lanka, has been designated as the reference laboratory for this disease.

Another disease unique to this part of the world is **Jembrana.** (See review, 13-3.) In 1986, 239 cases were recorded in Bali, Indonesia; 188 of these were fatal. For 1985, the figures were 882 cases and 164 fatal.

Ephemeral fever is usually considered a disease affecting cattle in Australia, even though it is also seen, if not reported, in other countries in eastern Asia. Taiwan used vaccines to control an outbreak in 1984, in which the disease caused abortions and death losses in dairy cattle.

Japanese B encephalitis is present in many countries on the Asian side of the Pacific. The main reservoirs appear to be domestic pig populations, where the virus seems to cause few problems, although it can affect other species, including humans.

A very active organization called the Regional Animal Production and Health Commission for Asia, the Far East, and the Pacific (APHCA) is headquartered in Bangkok, Thailand, under the sponsorship of the United Nations Food and Agriculture Organization (FAO). With a current membership of 11 countries from the region, APHCA provides a forum for leading veterinary authorities from member and other countries to discuss and coordinate animal health issues, control measures, mutual assistance, and appropriate training programs. The group has been in operation for 10 years and can lay claim to demonstrable

successes in the improvement of the regional animal health situation and livestock production. (Dr. Hans J. Seyffert, Veterinary Attache, American Embassy, Manila, APO San Francisco 96528, 632-521-7116)

World Animal Disease Update

Italy continues to report outbreaks of **FMD** serotype A_5. Italian animal health officials requested that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), send a team of experts to evaluate the FMD situation in Italy. The team conducted their review on January 7-16, 1987. Since the beginning of the outbreak in November 1984, the approximate cost to the Italian Government for FMD control has been $24.8 million, including approximately $10.2 million for vaccination and $14.6 million for indemnity. In Africa, Tanzania has reported an outbreak of FMD, and the Pirbright World Reference Laboratory has identified a sample from Tanzania as serotype SAT_2. Seven samples from Cameroon were found positive for serotype A. Kenya also reported FMD outbreaks. In the Middle East, Pirbright reported samples from Saudi Arabia were positive for serotypes O and A, and two samples from North Yemen were positive for serotype O. In the Americas, Paraguay reported 2 outbreaks of FMD involving 579 bovines, and Chile reported 4 outbreaks in mid-February 1987.

USDA has officially declared Belgium free of **African swine fever** (ASF) as of December 17, 1986. In addition, USDA is now considering The Netherlands request to be declared free of ASF. The last case of ASF in The Netherlands was reported on April 1, 1986. In Mozambique an outbreak of ASF was reported in which 220 pigs died and 520 were sacrificed. Slaughter, disinfection, and control of animal movements were instituted. In Malawi, an outbreak in which 20 swine died and 30 were destroyed was reported. All sanitary measures were instituted according to authorities. Zaire also reported outbreaks of ASF as did Sardinia, Italy.

An outbreak of **RP** was reported in Burkina Faso in a herd of 10 cattle in which 2 were infected and 1 died. Two outbreaks of RP were reported in Ghana. One involved a herd of 139 cattle in which 20 died and 4 were destroyed. The other was in a herd of 48 animals, in which 15 died and 3 were destroyed. The source of the latter outbreak was reported as an illegally imported Zebu heifer. One outbreak was reported in Uganda. Movement of livestock into and out of the affected district was prohibited.

Japan has reported 12 outbreaks of HC. All of these new cases have been confined to the Okinawa Prefecture. The disease has not been reported in Japan since April 1985 when it was diagnosed in swine in Kagoshima Prefecture. The diagnosis was based on clinical and postmortem inspections and the Fluorescent Antibody (FA) test. Control measures included slaughter of infected pigs, disinfection of infected premises, isolation of healthy pigs, emergency vaccination, and movement control. Elsewhere in Asia, Korea, Taiwan, and Malaysia reported HC. In Europe, West Germany, Belgium, Austria, France, and Italy reported outbreaks, as did Chile in the Americas. (Dr. James T. Cavanaugh, 301-436-8285)

Swine Parvoviral Disease

A vesicular-like disease of piglets has been associated with systemic parvoviral infection. Vesicle-like and necrotic lesions were observed in 1- to 4-week-old pigs, but were not seen in older pigs and adult swine. Pox-like lesions on udders of some sows were reported from one farm. When investigating outbreaks of suspected porcine vesicular disease, diagnosticians should consider parvovirus as a possible primary pathogen.

For approximately 20 years, a vesicular-like disease affecting baby pigs has occurred sporadically in Iowa and a few neighboring States, according to Drs. J. J. Andrews of the Veterinary Diagnostic Laboratory, Iowa State University, Ames, Iowa, and Martin Bergeland, Veterinary Diagnostic Laboratory, University of Minnesota, St. Paul, Minnesota. This disease has occasionally been seen in groups of piglets with generalized exudative dermatitis (greasy pig disease), according to Dr. Andrews. (Vet. Pathol. 16:432-437, 1979).

Outbreaks in six herds which occurred within 5 weeks were reported (Kresse et. al., Veterinary Microbiol. 10:525-536 1985). Porcine parvovirus was isolated from visceral organs, brain, skin, nasal or nasopharyngeal swabs, and serums of affected pigs. Severe lesions were seen on the hard palate, floor of the mouth, gingiva, tongue, snout, coronary band, and in the interdigital spaces. Parvoviral antigen was demonstrated by immunofluorescence in the outer layers of hair follicles of skin adjacent to coronary band lesions.

In 1986, a similar disease occurred in Minnesota. Tonsil, tongue, and skin specimens were submitted to the National Veterinary Services Laboratories (NVSL), Ames, Iowa. Parvovirus was isolated from the pooled specimens. Each of the three organs was positive for parvoviral antigen by immunofluorescence. Fluorescence was seen in hair follicles and adnexal structures, probably ducts of sebaceous glands, as well as in tonsillar epithelium and in cells immediately beneath the tonsillar mucosa. In skin specimens submitted from previous epizootics, fluorescence was seen only in the surface layers of epithelium lining the hair follicles.

Lesions on the tongue and hard palate ranged from slit-like erosions to almost complete denudation. Necrosis was extensive throughout the buccal cavity, in the interdigital spaces, and on the lips, snout, and coronary band. Necrosis sometimes caused separation or sloughing of the hoof wall. Lameness, anorexia, diarrhea, conjunctivitis, and sneezing were observed, but not all of these signs were present on every farm. Generally, 1- to 2-week-old pigs were most severely affected. However, on two farms some 4-week-old pigs were afflicted.

Vesicles were rarely seen in the field. Rather, investigators usually described abundant necrotic lesions resembling ruptured vesicles. One pig, submitted alive, had a snout lesion which was indistinguishable from a vesicle. However, when the lesion was transected, the epidermis was found to be elevated by edema in the subcutis. A similar, formalin-fixed, intact snout lesion

was submitted from another State. Also, a veterinarian investigating an outbreak of similar disease on a third farm reported that early lesions on the foot pads of some pigs were of a vesicular nature ("blisters").

The disease spread between three farms owned by a father and son in Indiana. Antibiotic therapy was started several days after the initial outbreak on the first farm. Morbidity exceeded 90 percent and mortality was 58 percent. Two weeks later, the disease began on the other farms. All baby pigs on these two farms were affected. Antibiotic therapy was initiated at the onset of disease. The mortality rate was 5.8 percent on one farm and zero on the other farm.

Spread of swine parvoviral disease between premises is apparently unusual. The disease was confined to individual herds during three other outbreaks.

Fifty-nine serums from three herds were tested against New Jersey and Indiana strains of vesicular stomatitis virus and Coxsackie B5 virus (which cross-reacts with swine vesicular disease virus). Included in the 59 serums were 24 paired sets. No antibodies against these antigens were detected.

Eight serums from two herds had antibodies against parvovirus. Hemagglutination inhibition titers ranged from 1/20 to 1/20,480.

Five necrotic tissue specimens and the supernatant fluid of cell cultures which had been inoculated with nasal or nasopharyngeal swabs from 17 pigs were tested by the complement fixation test with antibodies for New Jersey and Indiana vesicular stomatitis virus, Coxsackie B5 virus, and six serotypes (A, O, C, and SAT 1, 2, and 3) of foot-and-mouth virus. All of these tests were negative.

Viruses from two outbreaks reported from NVSL (Kresse et. al., ibid., 1985) are being studied at the University of Minnesota. Choi and co-workers (in press) are reporting some distinctive biological markers which differentiate these two isolates from other porcine parvovirus isolates commonly associated with mummification, abortion, and stillbirth in swine.

It seems reasonable to speculate that this sporadically occurring disease stems from a dual viral and bacterial infection. The initial outbreak in Indiana resulted in a very high mortality rate when antibiotic therapy was delayed, whereas the mortality was greatly reduced on two nearby farms when treatment was promptly initiated. Ten pigs experimentally inoculated at NVSL with cell culture virus had a longer prodromal period (7 to 11 days) and less severe disease than two pigs inoculated with a tissue suspension. Clinical signs disappeared by 24 days in all but one of the pigs that were inoculated with cell culture virus. In contrast, two pigs experimentally inoculated with a crude skin suspension developed clinical signs in 3 days and their condition progressively deteriorated. Lesions in the two pigs closely resembled those seen in the field. No intact vesicle was seen in

the experimentally inoculated pigs. (J. I. Kresse and Dr. W. D. Taylor, National Veterinary Services Laboratories, APHIS, USDA, Ames, IA 50010)

Spider Lamb Syndrome

(Editor's note: The following article is included in the Foreign Animal Disease Report for general interest, and to provide information potentially useful in the differential diagnosis of Akabane disease of sheep.)

During the 1984 and 1985 lambing seasons, reports of skeletal deformities in midwestern lambs began surfacing. Sheep producers and veterinary practitioners were hearing terms such as "spiders," "spider lambs," "corkscrew lambs," "monkey lambs," "crooked legged lambs," and "bent lambs," used to describe the appearance of affected lambs.

A cooperative investigation into the spider lamb syndrome has been in progress at Michigan State University since the spring of 1984, by veterinary pathologists (Drs. Krehbiel, Trapp, and Yamini), clinical scientists (Drs. Rook, Kopcha, and Spaulding), and animal scientists (Drs. Benson and Henneman and Mr. George Good.) The purpose of this article is to describe the characteristics of spider lamb syndrome, as observed in lambs in Ohio and Michigan.

To date, 40 spider lambs from Ohio and Michigan producers have been examined at autopsy. Primary abnormalities involved only the musculoskeletal system and were most obvious in the limbs. Extreme height, fineness of bone, lack of muscling, and angular limb deformities gave a spider-like appearance to the lambs (fig.1).

Figure 1. Spider lamb syndrome, Suffolk lamb.

Spider lambs appeared as two distinct entities: 1) lambs grossly abnormal at birth, and 2) lambs apparently normal at birth which developed the spider conformation at 4-6 weeks of age. In severely affected individuals, abnormalities were readily apparent at birth and were often lethal. Facial deformities (fig.2), angular limb deformities, and spinal curvature (fig. 3) caused inability to rise and nurse.

Figure 2. Facial deformities, newborn Suffolk lamb with spider lamb syndrome.

Figure 3, Limb and spine deformities, Suffolk lamb with spider lamb syndrome.

Some affected lambs did not have easily identifiable characteristics of the syndrome for several weeks. They were often selected by producers as the most modern, show-ring quality lambs. Disproportionate body to leg ratio, extreme neck length, Roman nose conformation, and a palpable concavity of the sternum were sometimes the only clues to early recognition.
Spider lambs that survived unassisted beyond the first week of life gained well until they were 2 or 3 weeks old. As age increased, spinal curvature, facial deformity, and extreme height became more accentuated. Lambs appeared to gain height with no accompanying increase in muscle mass. Signs included arthritis, joint pain, inability to walk, and secondary pneumonia.

Six spider lambs and eight normal flockmates from the Michigan State University flock were studied during 1985. Complete blood counts, chemistry profiles, serum nutritional assays, and screening for several viral diseases revealed no significant differences. However, serial radiographic evaluations were most revealing. Diagnoses of the spider lamb syndrome were confirmed radiologically even in newborn lambs not yet exhibiting obvious deformities. All spider lambs manifested radiographic changes.

Comparison of radiographic and autopsy findings confirmed a syndrome involving growth plate cartilage in young developing lambs. Growth plate cartilage is normally highly organized in singular areas, allowing growth and bone deposition to occur in a uniform, controlled pattern. In a lateral radiograph of the olecranon, uniform nonmineralized cartilage of a normal lamb appears as a radiolucent line surrounded by dense radiopaque bone. In contrast, all spider lambs exhibited multiple islands of ossification throughout the olecranon with no uniform direction or pattern.

Radiographically, microscopically, and on gross postmortem examination, the cartilage defect (chondrodysplasia) appeared throughout the skeleton. Areas such as the sternum exhibited multiple irregular islands of bone and cartilage unlike the normal bipartite sternum. Other areas such as the shoulder showed roughened irregular joint areas, islands of ossification, and arthritis typical of the maturing spider lamb.

Postmortem examination supported the radiographic findings and generalized nature of the chondrodysplasia. Sections of the elbow (fig. 4) revealed multiple islands of ossification similar to those observed radiographically.

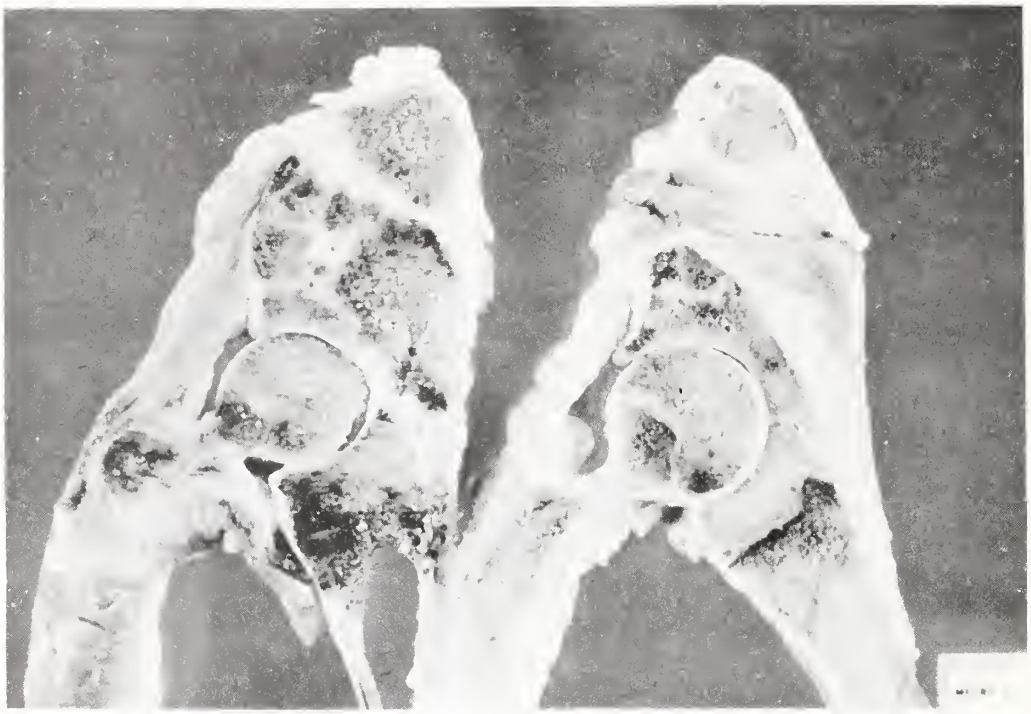

Figure 4. Sections of elbow, Suffolk lamb with spider lamb syndrome.

Sections of cuboidal bones (fig. 5) also exhibited bizarre pillars of cartilage which may have affected vertebral symmetry. The fan-like pattern of the cartilage pillars may have allowed compression and shortening of the vertebrae in one direction and lengthening in another. This asymmetry, multiplied by many vertebrae and influenced by external forces, may explain great variation in the spinal deviations observed. Articular cartilage also appeared to be involved, as evidenced by cartilage erosions in numerous joints.

Figure 5. Section of vertebrae of Suffolk lamb with spider lamb syndrome.

Histologically, a generalized chondrodysplasia was noted. Microscopic examination of growth plate areas suggested a defective pattern of ossification. The normal "stack of coins" appearance of chondrocytes, with uniform tongues of cartilage ossifying to trabecular bone, appeared chaotic in the spider lamb. Chondrocytes lost pattern and direction, forming widened irregular tongues of ossifying cartilage with areas of proliferation beginning in areas of maturation.

At this writing, spider lamb syndrome has been recorded only in lambs of purebred Suffolk parentage, lambs from crossbred ewes with a large percentage of Suffolk, or lambs from Hampshire ewes bred to Suffolk sires.

Observations of the Michigan State University (MSU) flock by Dr. H. A. Henneman (MSU) and Dr. D. L. Thomas (University of Illinois) and breeder reports in Michigan and Ohio suggested an inherited trait. Nearly one-quarter of the 1985 purebred Suffolk lambs in the Michigan State University flock were spider lambs. Pedigree analysis from 1980 to 1986 and limited progency testing during 1985-86 suggested a simple recessive type of inheritance. The fact that normal appearing parents produced spider lambs also suggested a recessive genetic trait.

Case reports show that in some multiple-sired flocks, all spider lambs were sired by one ram and inbreeding increased the frequency of spider lambs. In flocks where two breeds were maintained under the same management, all spider syndrome lambs occurred in one breed. Both normal and spider twin births occurred.

Current publicity and confusion about spider lambs may be responsible for an erroneous impression that this syndrome may be prevalent within the general sheep population. Nevertheless, the importance of the spider lamb syndrome to purebred Suffolk producers cannot be ignored. Suffolk and Hampshire breeders should maintain accurate breeding records in an effort to identify and exclude from their flocks any carriers of spider syndrome genes. (Dr. Joseph S. Rook, College of Veterinary Medicine, Michigan State University, East Lansing, MI 48824-1314)

Cascado in Indonesia

A skin condition known in Indonesia as Cascado has caused significant economic losses in cattle. At least one water buffalo reportedly was also infected in Sulawesi. Cases of Cascado have been reported from eight provinces of Indonesia: North Sulawesi, Central Sulawesi, West Kalimantan, Lampung, Jambi, Riau, North Sumatra, and Aceh. A dermatofilariasis caused by Stephanofilaria spp., the disease affects up to 90 percent of bovines in endemic areas.

Stephanofilaria spp. are nematode parasites of animals. Species known to cause Cascado are dedoesi in the Sulawesi and Kalimantan provinces, and kaeli in west Sumatra. Dedoesi affects many parts of the body whereas kaeli primarily attacks the legs and mammary glands. These parasites are viviparous: the females give birth to live microfilaria. Adult worms live in the skin where they cause a skin-damaging malpighian inflammation.

The life cycle requires a biting fly as an intermediate host. The development of microfilaria to the adult stage takes place in the bodies of biting flies, including Musca, Stomoxys, and Hematobia. Flies become infected while feeding on wound fluids containing microfilaria. Adult worms are transmitted from the biting fly to the skin of the susceptible bovine.

Wounds caused by the biting fly first appear as small, thickly encrusted lesions. Lesions may reach a diameter of 10 inches and are commonly located around the eyes and on the neck, and shoulders, legs, and mammary gland. Skin lesions remain localized and do not cause mortality.

Diagnosis is based on clinical signs and laboratory confirmation of microfilaria. Specimens for laboratory examination should include either deep wound scrapings in 50 percent glycerin media or skin sections in 10 percent formalin solution, or both. Screwworm infestations and other myiases may sometimes be confused with Cascado. Immunity to Cascado is unknown. Control measures include the use of pesticides and the separation of healthy cattle from infected cattle. Pesticides successfully used for fly control in Indonesia include coumaphos, diazinon, and malathion. Insecticides have been applied directly onto wounds to kill the adult Stephanofilaria. Ointments containing 1.0 to 2.0 percent coumaphos have been found useful for the treatment of skin lesions. (Dr. Djamaluddin H. Usman, Mataram Lombok, Indonesia, in cooperation with Dr. J. Cavanaugh, 301-436-8282)

Research at Plum Island

(Note: The following report is the second of a series on foreign animal disease research at Plum Island Animal Disease Center (PIADC), Agricultural Research Service, U.S. Department of Agriculture, Greenport, NY)

Heartwater, an often fatal rickettsial disease caused by Cowdria ruminantium in wild and domestic ruminants, is widespread in sub-Saharian Africa and was confirmed on three Caribbean Islands as recently as 1980 and 1984. Twelve species of Amblyomma ticks can be vectors of heartwater. One of the most common African vectors, A. variegatum, has spread onto 16 Caribbean Islands. Two U.S. species, A. maculatum and A. cajennese, have been shown to be vectors of heartwater. The potential introduction of heartwater and the establishment of this tick-borne disease on the U.S. mainland could result in millions of dollars of economic loss to the U.S. livestock industry and could severely affect our white tail deer population.

Five isolates of C. ruminantium have been collected from Africa and the Caribbean. Four of these have been compared in cross-immunity tests in goats. The results show that there are different antigenic types of C. ruminantium. Hematological studies and primary leukocyte cultures have revealed that C. ruminantium circulates in neutrophils. C. ruminantium infected neutrophils were collected and maintained for several days in vitro to allow C. ruminantium colonies to develop. These infected neutrophils have been used successfully to develop and an indirect fluorescent antibody test (IFAT) to detect antibody

in animal sera. The use of the IFAT has allowed the investigators to compare the serological relationship of C. ruminantium to other rickettsia. C. ruminantium serologically cross-reacts with Ehrlichia equi and Ehrlichia canis. The future goals in C. ruminantium research center on the successful in vitro cultivation of C. ruminantium in a continuous cell line. (Dr. L. Logan, PIADC, Greenport, NY, 516-323-2500)

Arthropods. Many of the foreign animal diseases threatening U.S. livestock are arthropod-borne. Among them are African swine fever, heartwater, East Coast fever, Rift Valley fever, and African horse sickness, to name just a few. It is entirely possible for such diseases to enter and gain a foothold in this country without being accompanied by their known vectors. Some may be harbored and transmitted by more than one genus of arthropods. It is very likely that suitable vectors for most, if not all, of these diseases may be found among the indigenous arthropods of the United States. It would be well to locate and identify these potential vectors before the diseases enter the country. With the information obtained, it may be possible to develop strategies for controlling or eradicating the vectors, or at least to be prepared to deal with the complications that might be expected with a particular disease incursion. African swine fever and heartwater have been selected for study because they offer the most immediate threat.

Argasid ticks of the genus Ornithodoros are known to harbor and transmit African swine fever virus in Africa. Five species of this genus that are present in North America and the Caribbean Basin are being tested for their potential as vectors of African swine fever virus. Four have been shown to transmit African swine fever virus (ASFV) transstadially (between stages of the tick life cycle). One of these O. puertoricensis, has been shown to transit the virus transovarially (through the egg to the next generation of ticks). Also, O. coriaceus, from the coastal areas of California and Mexico, is capable of carrying and transmitting ASFV at least 502 days after a single feeding on an infected animal (W. R. Hess, et al., Potential arthropod vectors of African swine fever in North America and the Caribbean Basin, Vet. Parasitol., in press).

Heartwater, a disease that has recently been found in islands of the Caribbean, is known to be transmitted by species of hard ticks in Africa. Related species of hard ticks found in this hemisphere will be tested as potential vectors of the disease. (Drs. W. R. Hess and R. G. Endris, PIADC, Greenport, NY, 516-323-2500)

Protein biochemistry studies of African swine fever virus (ASFV) are underway to identify the sequence of appearance and functions of ASFV proteins produced during virus replication. The location of proteins in the complex structure of the virus is being determined to understand their relationship to immune responses in infected swine. Genetic studies on ASFV are oriented toward mapping proteins of interest on the viral genome. Gene segments are being cloned into bacterial plasmid expression systems to

examine the feasibility of generating selected ASFV proteins in an ASFV-free production system. The role of these proteins in immune responses to ASF and their usefulness as diagnostic reagents are being examined. Also, segments of cloned ASFV DNA are being used as molecular hybridization probes for the detection of active ASF viral replication in infected swine. During chronic ASF infections in swine, immune responses in the host make detection of the infectious virus difficult. The use of sensitive DNA detection methods may allow location of the infectious virus in chronically infected swine. (Dr. D. M. Moore, PIADC, Greenport, NY, 516-323-2500)

Tropical Bont Ticks and Associated Diseases in the Caribbean

The U.S. Department of Agriculture (USDA) is cooperating with an international team of experts to develop a feasibility proposal on the management of the tropical bont tick and its associated diseases in the Caribbean.

The tropical bont tick, Amblyomma variegatum, was introduced into the Caribbean about 1830 when infested cattle were imported into Guadaloupe from Senegal, West Africa. Since then, the tick has spread to a number of neighboring islands. Amblyomma variegatum is an important vector of the rickettsia, Cowdria ruminantium, the causative agent of heartwater (cowdriosis) in ruminants. Heartwater is in many cases a minor problem in local stock in endemic areas. However, when introduced into disease-free areas or when susceptible livestock are introduced into endemic areas, the disease causes high mortality. In the Caribbean, heartwater has been reported from the islands of Guadeloupe, Marie Galante, and Antigua.

Another disease of ruminants found in the Caribbean is dermatophilosis (cutaneous streptothricosis), an epidermal skin infection caused by the bacterium, Dermatophilus congolensis. This bacterium is widespread in nature and can cause an acute dermal disease of cattle, sheep, and other livestock when infective zoospores penetrate the skin. Incidence of acute dermatophilosis increases dramatically when A. variegatum is found in a previously uninfested area.

Where A. variegatum and its associated diseases are found, producers experience losses in livestock production. These losses are especially acute in susceptible livestock imported into the islands in order to increase production of needed animal proteins and products. Producers must treat their animals with acaricides to control ticks and with antibiotics if they wish to reduce mortality due to bacterial diseases, especially dermatophilosis.

In uninfested countries in the Caribbean, as well as mainland countries of North, Central, and South America surrounding the Caribbean region, livestock production is threatened by the presence of A. variegatum and its associated diseases.

Based upon observations of the dynamics of the spread of A. variegatum and the increased incidence of acute dermatophilosis, both appear to have spread rapidly in recent years with an

increase in interisland livestock movement, both legal and illegal. Another possibility is that migratory birds, such as the cattle egret, are spreading A. variegatum.

The feasibility proposal places countries and islands in the Caribbean region in the following four risk classes, based on infestation levels of A. variegatum:

I. Considered free of the tick and at low risk of infestation--all the mainland countries and all the islands and countries of the Caribbean not listed in the remaining risk classes.

II. Presently uninfested islands or tick reported, but not considered established, and at high risk of infestation--Barbados, Barbuda, Les Saintes, Saba, St. Barthelemy, St. Eustatius, St. Vincent, and the Grenadines, British Virgin Islands and U.S. Virgin Islands.

III. Tick established, but with limited distribution--Anguilla, Dominica, La Desirade, Martinique, Montserrat, Puerto Rico, St. Lucia, and St. Martin/St. Maarten.

IV. Tick widespread - Antigua, Guadaloupe, Marie Galante, Nevis, and St. Kitts.

While several countries of the region have adequate veterinary services for routine purposes, most are generally ill equipped technically, organizationally, and financially to deal with the problem. Existing animal health regulations appear to be adequate in most cases to control legal animal movements. Several countries have tick control programs, although they are in most cases not aimed at tick eradication.

Economic evaluations were presented in the feasibility proposal to provide estimates of the potential financial impact of the introduction and spread of A. variegatum and its associated diseases to uninfested islands and mainland areas of the Caribbean region. Also, such evaluations provided estimates of expected increased productivity of livestock as the result of eradication of the problem where it is presently found. Four strategies were proposed to manage the problem according to the incidence and distribution of A. variegatum. The strategy for Risk Class I countries includes the dissemination of information, a limited official surveillance program, and an effective quarantine system. Strategy for Risk Class II countries includes education, survey of animals, and an animal treatment and quarantine system. Strategy for Risk Class III countries includes treatment, education, surveillance, a mandatory systematic acaricide treatment program to eradicate A. variegatum, and a following surveillance program. And, for Risk Class IV countries, the strategy includes a survey, an educational program, and a voluntary treatment program which could lead to a mandatory systematic treatment program to eradicate A. variegatum. The total budget for all programs was estimated to be $35 million. (Dr. D. D. Wilson, 301-436-8695)

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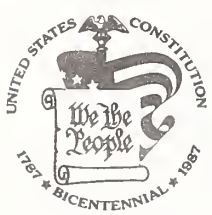

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